CONNECTICUT YANKEE ATOMIC POWER COMPANY

HADDAM NECK PLANT
362 INJUN HOLLOW ROAD • EAST HAMPTON, CT 06424-3099

June 3, 1994
Re: 10CFR50.73(a)(2)(i)
10CFR50.73(a)(2)(vii)

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Reference: Facility Operating License No. DPR-61
Docket No. 50-213
Reportable Occurrence LER 50-213/94-002-01

Gentlemen:

This letter forwards the Supplemental Licensee Event Report 94-002-01, required to be submitted, pursuant to the requirements of the Haddam Neck Plant's Technical Specifications.

Very truly yours,

John P. Stetz
Vice President

JPS/mlg

Attachment: LER 50-213/94-002-01

cc: Mr. Thomas T. Martin
Regional Administrator, Region I
475 Allendale Road
King of Prussia, PA 19406

William Raymond
Sr. Resident Inspector
Haddam Neck

100020

1028-3 REV 2-91

IE22

NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Haddam Neck	0 5 0 0 0 2 1 3	1 OF 0 5

TITLE (4)

Service Water System Declared Inoperable Due to Pipe Weld Flaws

EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR		SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
											0 5 0 0 0
0 2	1 2	9 4	9 4	—	0 0 2	— 0 1	0 6	0 3	9 4		0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
1		20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
1 0 0		20.405(a)(1)(ii)	50.36(c)(2)	X 50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
R. Kasuga, Engineering Systems	2 0 3 — 2 6 7 - 2 5 5 6

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)

		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

ABSTRACT

On February 12, 1994, at approximately 0945 hours, with the plant in Mode 1 at 100% power, a pin hole leak developed on the Service Water System (SWS) supply piping to the "A" Emergency Diesel Generator . The leak occurred on the first weld upstream of a manual isolation valve . This weld was undergoing light surface grinding in preparation for Ultrasonic Test (UT) inspection. This work was part of an ongoing inspection and evaluation effort related to some noted corrosion of this piping and associated welds. Following leak initiation, both SWS headers were conservatively declared inoperable since previous assumptions regarding weld thickness and structural capability were considered suspect. Plant operators entered Technical Specification 3.0.3, immediately commenced a shutdown and entered Mode 5 at 1810 hours on February 13, 1994. The root cause of this event was determined to be Microbiologically Influenced Corrosion (MIC). Initial corrective action was to initiate replacement of the SWS lines to the diesels via a plant modification. Additional corrective action included inspecting other applicable safety related locations and conducting repairs as appropriate. This supplemental report is being submitted to provide the results of the root cause evaluation and to address the additional corrective actions taken.

BACKGROUND INFORMATION

The Service Water System (EIIS Code: BI) is composed of two headers that provide cooling flow to various safety and non-safety related components throughout the plant. A service water header is composed of two service water pumps and the safety related piping and components. Each service water header supplies cooling water to an associated emergency diesel generator (EDG)(EIIS Code: EK).

In March, 1993 a pinhole leak developed in a weld on the Service Water System (SWS) supply piping to the "B" Emergency Diesel Generator (EG2B) during surface preparation for Ultrasonic testing of the surrounding base metal. A relief request was initiated in accordance with Generic Letter 90-05. In May 1993, during a shutdown for a refueling outage, the affected section of piping and the equivalent piping from the "A" header was replaced. A subsequent root cause investigation of the leaking weld considered the cause of the leak to be poor initial weld quality with some potential for Microbiologically Influenced Corrosion (MIC) involvement. The leaking weld was assessed and considered to have been operable from a seismic structural standpoint.

During September through November, 1993 discussions were held regarding followup inspections to identify if any other areas of service water piping or welds may be subject to the noted corrosion. At that time radiography was considered as the principle inspection technique due to its non intrusive nature, although some limitations were recognized. As an improved alternative, during January 1994, a section of piping with welds was cut out and replaced during a planned emergency diesel generator outage . This section of piping and associated welds were sent to the Northeast Utilities materials group for root cause investigation which included visual, radiographic, metallurgical, and biological examinations. In general, although some corrosion was evident, the condition of these welds was far superior to those which had been previously evaluated in March and May 1993.

Subsequently, a decision was made to perform radiography on all the accessible welds on the SWS supply lines to both diesels. A total of nineteen welds were radiographed. Corrosion was noted on a number of the welds, however, three of these (numbered 12, 21, and 22) were considered to be the most degraded and of a condition equivalent to the welds inspected during the 1993 refueling outage. Efforts were initiated to characterize the identified weld flaws using Non Destructive Examination (NDE) techniques.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Haddam Neck	0 5 0 0 0 2 1 3	9 4	— 0 0 2	— 0 1	0 4 OF 0 5

TEXT (If more space is required, use additional NRC Form 366A's) (17)

SAFETY ASSESSMENT

This event is reportable under 10CFR50.73(a)(2)(i)(A) because it resulted in the completion of a plant shutdown required by the plant Technical Specifications and 10CFR50.73(a)(2)(i)(B) because it resulted in a condition prohibited by the Technical Specifications. Technical Specification 3.7.3 requires two service water headers to be operable in Modes 1, 2, 3 and 4. Since there is no ACTION statement for both headers being inoperable plant operators entered Technical Specification 3.0.3. This condition is also reportable under 10CFR50.73(a)(2)(vii)(D) as a common mode failure.

The three most severely degraded welds (#12, 21, & 22) were removed from the system as part of the emergency diesel supply piping modifications. Welds #21 and 22 were evaluated for structural integrity and weld #12 was provided to the NRC resident inspector in the as found condition at the request of the NRC staff. The structural integrity assessment performed on the degraded cross sections of welds #21 and 22 was done based on the through-wall flaw approach as described in NRC Generic Letter (GL) 90-05. Design loads applied to the flaw included a combination of dead weight, thermal, pressure and SSE. As required, a factor of safety of 1.4 was applied to the combined stresses. Based on calculations, it was concluded that the worst case degraded cross-section of the as found pipe welds located in the unisolable portions of EG2A and EG2B supply piping met the GL 90-05 acceptance criteria for structural integrity and the degraded piping would have remained operable from a mechanical/structural standpoint. In addition to the aforementioned EDG welds, numerous welds considered to be the most degraded from other stagnant SWS piping were evaluated after removal. Since the other stagnant piping systems are part of SEP and no dynamic loads are available, no calculations were performed to determine operability. However, it was determined by visual inspection that the extent of weld degradation was less severe than the welds identified as #21 and #22. Therefore, this event had minimal safety significance.

CORRECTIVE ACTION

Plant operators entered Technical Specification 3.0.3, immediately commenced a shutdown and entered Mode 5 at 1810 hours on February 13, 1994. Initial corrective action was to initiate replacement of the affected sections of the SWS lines to the EDGs via a plant modification. This modification includes a rerouting of these lines such that previously underground sections of piping are now accessible.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Haddam Neck	0 5 0 0 0 2 1 3	9 4	— 0 0 2	— 0 1	0 3 OF 0 5

TEXT (If more space is required, use additional NRC Form 366A's) (17)

EVENT DESCRIPTION

On February 12, 1994, at approximately 0945 hours with the plant in Mode 1 at 100% power, a pin hole leak developed on the Service Water System supply piping to the "A" Emergency Diesel Generator (EG2A). The leak occurred on the first weld upstream of the manual isolation valve (SW-V-144A). This location is not isolable from the main turbine building supply header (12"-WS-121-21). The weld was undergoing light surface grinding in preparation for an Ultrasonic Test (UT) which was part of an ongoing inspection and evaluation effort related to some noted corrosion of this piping and associated welds. This corrosion was identified via radiography (RT) of the affected welds with the lines in service (full of water). Results of this RT identified some corrosion was present, to varying degrees, on a number of the inservice welds. Of these welds, three (numbered 12, 21, & 22) were considered to be the most severely corroded. An attempt was made to characterize the remaining material in these welds using an Eddy Current Testing (ECT) technique. The initial results of the ECT indicated that sufficient material remained such that the condition of welds 12, 21, and 22 was considered bounded by a previous analysis of the weld which leaked during the refueling outage. Subsequently, a decision was made to perform ultrasonic testing of the welds to further characterize the condition of these welds. Light grinding was initiated in order to prepare the weld for UT. A pinhole leak developed in the area being ground. Following leak initiation, both SWS headers were conservatively declared inoperable since previous assumptions regarding weld thickness and structural capability during a design basis seismic event were considered suspect.

CAUSE OF THE EVENT

Results of investigations to date indicate that the cause of the event is Microbiologically Influenced Corrosion (MIC) in sections of the affected SWS lines exacerbated by initial weld defects. Additional inspections performed on other emergency diesel generator welds and stagnant system piping throughout the service water system showed signs of MIC to varying degrees. Inspections of intermittent and constant flow lines in various high risk areas were performed with the assistance of a MIC expert and no signs of MIC involvement were discovered. Therefore the final root cause of the event has been confirmed as Microbiologically Influenced Corrosion of service water stagnant piping with lack of weld penetration in original weld contributing to the degradation.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Haddam Neck	0 5 0 0 0 2 1 3	9 4	— 0 0 2	— 0 1	0 5 OF 0 5

TEXT (If more space is required, use additional NRC Form 366A's) (17)

Additional inspections of numerous areas of the service water system, using various NDE methods and MIC cultures, led to extensive piping replacement activities. All piping replaced was in stagnant portions of the system. All new replacement piping and repaired butt welds were radiographed and repaired as necessary to ensure no unacceptable defects existed which would allow for a preferential MIC initiation site. No evidence of MIC was found in constant or intermittent flow subsystems during NDE, visual or microbiological inspections.

To prevent and monitor future Microbiologically Influenced Corrosion, a program has been initiated which requires periodic inspections, the evaluation and implementation of preventative chemicals, the implementation of changes to operating practices and the investigation of effective system design changes which will reduce/eliminate the potential for MIC. This program was approved on April 1, 1994 and will be revised as additional information and experience is gathered.

ADDITIONAL INFORMATION

This LER provides the results of the root cause analysis and the corrective actions taken.

PREVIOUS SIMILAR EVENTS

None